

1-22335

REMARKS

This paper is in response to the office action dated November 26, 2003. Claims 1, 3-7, 9-12, 29-32, 34-37, and 39-41 are pending. Applicants have cancelled claims 2 and 8 without prejudice or disclaimer, and incorporated the limitations of those claims into independent claims 1 and 7, respectively. Applicants have also amended claim 29 and 34. Applicants request reconsideration in light of the following remarks, and withdrawal of the outstanding rejections of the claims.

In the office action the Examiner finally rejected claims 1-5 and 7-11 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,786,269 to Murakami et al. (hereinafter "Murakami"). Also, the Examiner rejected claims 6, 12 and 40-41 as being unpatentable under 35 U.S.C. §103(a) as being made obvious by Murakami. Further, the Examiner rejected claims 29-32, 34-37 and 39 as being made obvious by Murakami in view of U.S. Patent No. 5,578,501 to Niwa (hereinafter, "Niwa"). Finally, the Examiner rejected claim 39 as being made obvious by Murakami in view of Niwa, and further in view of U.S. Patent No. 5,393,675 to Compaan (hereinafter, "Compaan"). Applicants contend that all the claims are patentable over Murakami, either alone or in combination with Compaan and/or Niwa, and request withdrawal of the rejections under 35 U.S.C. §102(b) and 35 U.S.C. §103(a).

Applicants note that the rejections by the Examiner are FINAL rejections. The Examiner indicated that the new grounds of rejection based on a new reference are permitted to be final rejections because of Applicants' previous amendment to the claims. Applicants respectfully point out that claim 33 as originally entered into the application included the limitation that the layer was a p-type layer. Therefore, the Examiner was fully apprised that Applicants considered the p-type layer limitation to be a patentably significant limitation, and the Examiner could not have been surprised by the

1-22335

incorporation of the p-type layer limitation into independent claims 1, 7, 29 and 34 in Applicants' previous amendment, filed September 30, 2004. Accordingly, the Examiner's action making the rejections based on the Murakami reference FINAL rejections is not warranted, and Applicants should have an opportunity to respond to the current rejections. Applicants respectfully request withdrawal of the finality of the rejections.

It is respectfully submitted that the Office Action does not meet the criteria for establishing a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, three criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the applied reference must teach or suggest all the claim limitations. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. Further, the fact that the claimed invention is within the capabilities of one of ordinary skill in the art is not sufficient by itself to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. See MPEP §2143.

The Murakami reference has no disclosure of the presence of nitrogen being used in a gaseous form during the sputter deposition of the film, as now provided in Applicants' independent claims 1, 7, 29 and 34, and as provided in originally filed claims 2 and 8. The Murakami reference discloses making a metallic nitride layer (less than 10 nm thick) using either "resistive heating evaporation, electron beam evaporation (preferred) or sputtering." The metal nitride layer includes NbN, VN, etc. None of these compounds are semiconductors. The sputtering process (or resistive heating evaporation or electron beam evaporation) includes the use of various nitrogen-containing

1-22335

compounds as the source materials, listed in Murakami at column 4, lines 39-42. The method of making the metal nitride layer does not include the use of gaseous nitrogen (N_2) or reactive sputtering. The two evaporation methods are incompatible with or are known to have poor efficacy to react with any gaseous nitrogen to produce the metallic nitride if a simple metal source were to be used (e.g., Nb, V, etc). For this reason, the Murakami reference simply does not teach Applicants' invention. Accordingly, Applicants request withdrawal of the rejections of the independent claims based on Murakami.

Even when the Niwa reference is added to the disclosure of the Murakami reference, there is still no disclosure of Applicants' invention. Niwa discloses a solar cell manufacturing process. At column 10, beginning at line 31, Niwa states that the zinc oxide layer in the solar cell contains carbon or nitrogen atoms, or both, "at a constant density of 5 atm % or less." It is believed that the reference to "atm %" pertains to the atomic mass. This clearly has nothing to do with the concentration of gaseous nitrogen during a sputtering process. Specifically there is no teaching of the specific invention defined in claims 29 and 34, wherein the sputtering is carried out in an atmosphere containing an amount of nitrogen within the range of from about 0.5 percent to about 3 percent. Accordingly, adding the Niwa reference to the disclosure of Murakami fails to result in a combined disclosure equivalent to the invention defined in Applicants' claims.

Even adding the disclosure of the Compaan reference to the disclosure of the Murakami and Niwa references, there is still not a combination meeting Applicants' independent claims. Accordingly, Applicants request withdrawal of the rejections of the independent claims based on Murakami, either taken alone, or in combination with Niwa or Compaan, or both.

Since the independent claims have been shown to be patentable over the Murakami and other cited references, at least for this reason the dependent claims are also patentable over those references.

1-22335

Further, Murakami also states that the semiconductor layer *of the device which incorporates the metallic nitride* is doped with nitrogen before or after the growth of the semiconductor layer. However Murakami states (column 4, line 61-63) that the semiconductor layer is to be formed by a known method such as MBE, MOCVD, or CVD. Sputtering is specifically NOT included in the methods for making the *semiconductor* layers. When nitrogen is incorporated during the semiconductor growth (by MBE, etc.), the nitrogen is to be incorporated by nitrogen radical doping. This radical doping method involves a remote plasma source that will use gaseous nitrogen (N₂ or other nitrogen-containing gas). Again, there is no disclosure of making a semiconductor by depositing a group II-group VI compound onto a substrate in the presence of nitrogen in a gaseous form using sputtering to produce a nitrogen-doped p-type semiconductor. For this additional reason, the Murakami reference does not teach Applicants' invention. Accordingly, Applicants reiterate their request for withdrawal of the rejections of the independent claims based on Murakami.

Additionally, the MBE method of Murakami suffers from the limited size of substrates that can be grown in comparison with the size of substrates achievable with the process of the invention. The use of reactive sputtering coupled with gaseous nitrogen containing compounds in the plasma of the growth region according to the invention allows substrates to be scaled to very large areas, thereby making the inventive process much more advantageous than the process disclosed in the Murakami patent. It can be appreciated that since these products are to be used in solar panels, size does matter. The increase in size of the semiconductor layer available with the present invention provides a great technical improvement over prior art techniques. For this reason, the Murakami reference does not teach all the limitations of claims 6 and 12, and therefore they are independently patentable over the Murakami

1-22335

reference. Accordingly, Applicants request withdrawal of the rejections of claims 6 and 12.

In view of the above amendments and remarks, Applicants have shown that the invention, as defined in the claims, is neither disclosed nor suggested by the references of record. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections of record, and allowance of all claims.